Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 50448

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Sixth Semester
Electronics and Communication Engineering
EC 6602 – ANTENNA AND WAVE PROPAGATION
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions :

PART – A (10×2=20 Marks)

1. An antenna has a field pattern given by $E(\theta) = \cos^2(\theta)$ for $0° \leq \theta \leq 90°$. Find HPBW.
2. Differentiate Radian and Steradian.
3. State Babinet's principle.
4. What are secondary antennas ? Give two examples.
5. State pattern multiplication.
6. What is tapering of arrays ?
7. For a 20 turn helical antenna operating at 3GHz with circumference C = 10 cm and the spacing between the turns 0.3λ, calculate the directivity and half-power beam width.
8. What is a frequency independent antenna ?
9. The critical frequency for an ionised layer is 5 MHz. Determine the electron density of the layer.
10. Define skip distance.

PART – B (5×16=80 Marks)

11. a) i) Draw a neat sketch of a 3 element Yagi-Uda antenna and explain its principle of operation. (12)

ii) Two half-wave vertical dipole antenna each with a gain of 1.64 are horizontally separated by a distance 100 km to form a transmitter – receiver link. The transmitter feeds its antenna with 10 W at 100 MHz. Calculate the power received by the other antenna. (4)

(OR)

b) Derive the field equations for an oscillating dipole starting from Maxwells equations. Derive the expression for its radiation resistance. (16)

12. a) i) Explain the principle of parabolic reflector antenna and discuss on different types of feed used with neat diagram. (12)

ii) The diameter of a parabolic reflector is 2m. For operation at 6GHz, find the beam width between first nulls and the gain. (4)

(OR)

b) Write short notes on :

i) Slot antenna. (8)

ii) Microstrip antenna. (8)

13. a) Derive the expression for the array factor of a linear array of four isotropic element spaced $\lambda/2$ apart fed with signals of equal amplitude and phase. Obtain the directions of maxima and minima. (16)

(OR)

b) i) Explain in detail the Binomial array and derive an expression for the array factor. Also obtain the excitation coefficients of a seven element binomial array. (14)

ii) What is phased array ? (2)

14. a) Design a 50 to 200MHz log periodic dipole antenna for gain corresponds to scale factor 0.8 and space factor. 0.15. Assume the gap spacing at the smallest dipole is 3.6 mm. **(16)**

(OR)

b) With a neat block diagram, explain the radiation pattern and gain of an antenna can be measured. **(16)**

15. a) Describe the structure of the atmosphere and specify the factors affecting the radio wave propagation. **(16)**

(OR)

b) i) Discuss briefly on the types of fading. **(7)**

ii) Obtain an expression for the refractive index of an ionospheric layer. **(9)**